

CLAIMS

1. (Amended) A solid-state image pickup device for an auto-focus comprising first and second linear sensor pairs each having a linear sensor for a base portion with a plurality of pixels and a linear sensor for a reference portion with a plurality of pixels in order to perform a focal point detection of a phase difference detecting type,

wherein said first linear sensor pair and said second linear sensor pair have a same pixel pitch, said first linear sensor pair and said second linear sensor pair are neighboring in parallel and are arranged so as to be relatively deviated in the arranging direction of said linear sensor for the base portion and said linear sensor for the reference portion, and a signal output to detect the focal point is executed by using both of said first linear sensor pair and said second linear sensor pair, a third linear sensor pair arranged in a direction which perpendicularly crosses said first and second linear sensor pairs; and a fourth linear sensor pair having a base-line length larger than that of said third linear sensor pair, and wherein said fourth linear sensor pair is arranged outside of said third linear sensor pair with respect to a direction of said base-line length, and wherein said third linear sensor pair and said

fourth linear sensor pair are arranged on a same straight line.

2. A device according to claim 1, wherein a deviation amount between said first linear sensor pair and said second linear sensor pair is equal to almost 0.5 pixel.
3. A device according to claim 1, wherein a photosensing unit of the pixel of said first linear sensor pair and a photosensing unit of the pixel of said second linear sensor pair are arranged so as to be neighboring.
4. A device according to claim 3, wherein there is no light shielding layer between photoelectric converting devices of said first linear sensor pair and said second linear sensor pair.
5. (Cancelled)
6. (Cancelled)
7. A solid-state image pickup device for an auto-focus for executing a multi-point detection with respect to a plurality of object positions, wherein a sensor for auto-focusing the object of at least the center of a display screen includes said first and second linear sensor pairs according to claim 1.

8. (Amended) A solid-state image pickup device for an auto-focus for executing a multi-point detection with respect to a plurality of object positions, wherein a sensor for auto-focusing the object of at least the center of a display screen includes said first to fourth linear sensor pairs according to claim 1.

5 9. (Amended) A device according to claim 1, wherein all of said linear sensor pairs have a same 10 pixel shape.

10. A device according to claim 1, wherein said first to fourth linear sensor pairs independently control an accumulation time of photocharges of a photoelectric converting device constructing said 15 pixel.

11. A device according to claim 10, wherein said photoelectric converting device is an amplifying type photoelectric converting device and the control of said accumulation time is made by using said 20 amplifying type photoelectric converting device in a real-time manner.

12. A device according to claim 11, wherein said solid-state image pickup device is a CMOS type solid-state image pickup device which can be 25 manufactured by a CMOS process.

13. An auto-focus camera having the solid-state image pickup device for the auto-focus according to claim 1.

AMENDED CLAIMS

[received by the International Bureau on 17 August 2005 (17.08.05);
original claims 1, 8-9 amended original claims 5-6 cancelled ; remaining claims unchanged]

1. (Amended) A solid-state image pickup device for an auto-focus comprising first and second linear sensor pairs each having a linear sensor for a base portion with a plurality of pixels and a linear sensor for a reference portion with a plurality of pixels in order to perform a focal point detection of a phase difference detecting type,
wherein said first linear sensor pair and said second linear sensor pair have a same pixel pitch,
said first linear sensor pair and said second linear sensor pair are neighboring in parallel and are arranged so as to be relatively deviated in the arranging direction of said linear sensor for the base portion and said linear sensor for the reference portion, and a signal output to detect the focal point is executed by using both of said first linear sensor pair and said second linear sensor pair,
a third linear sensor pair arranged in a direction which perpendicularly crosses said first and second linear sensor pairs; and
a fourth linear sensor pair having a base-line length larger than that of said third linear sensor pair, and wherein said fourth linear sensor pair is arranged outside of said third linear sensor pair with respect to a direction of said base-line length, and wherein said third linear sensor pair and said

fourth linear sensor pair are arranged on a same straight line.

2. A device according to claim 1, wherein a deviation amount between said first linear sensor 5 pair and said second linear sensor pair is equal to almost 0.5 pixel.

3. A device according to claim 1, wherein a photosensing unit of the pixel of said first linear sensor pair and a photosensing unit of the pixel of 10 said second linear sensor pair are arranged so as to be neighboring.

4. A device according to claim 3, wherein there is no light shielding layer between photoelectric converting devices of said first linear sensor pair 15 and said second linear sensor pair.

5. (Cancelled)

6. (Cancelled)

7. A solid-state image pickup device for an auto-focus for executing a multi-point detection with 20 respect to a plurality of object positions, wherein a sensor for auto-focusing the object of at least the center of a display screen includes said first and second linear sensor pairs according to claim 1.

8. (Amended) A solid-state image pickup device for an auto-focus for executing a multi-point detection with respect to a plurality of object positions, wherein a sensor for auto-focusing the 5 object of at least the center of a display screen includes said first to fourth linear sensor pairs according to claim 1.

9. (Amended) A device according to claim 1, wherein all of said linear sensor pairs have a same 10 pixel shape.

10. A device according to claim 1, wherein said first to fourth linear sensor pairs independently control an accumulation time of photocharges of a photoelectric converting device constructing said 15 pixel.

11. A device according to claim 10, wherein said photoelectric converting device is an amplifying type photoelectric converting device and the control of said accumulation time is made by using said 20 amplifying type photoelectric converting device in a real-time manner.

12. A device according to claim 11, wherein said solid-state image pickup device is a CMOS type solid-state image pickup device which can be 25 manufactured by a CMOS process.

13. An auto-focus camera having the solid-state image pickup device for the auto-focus according to claim 1.